

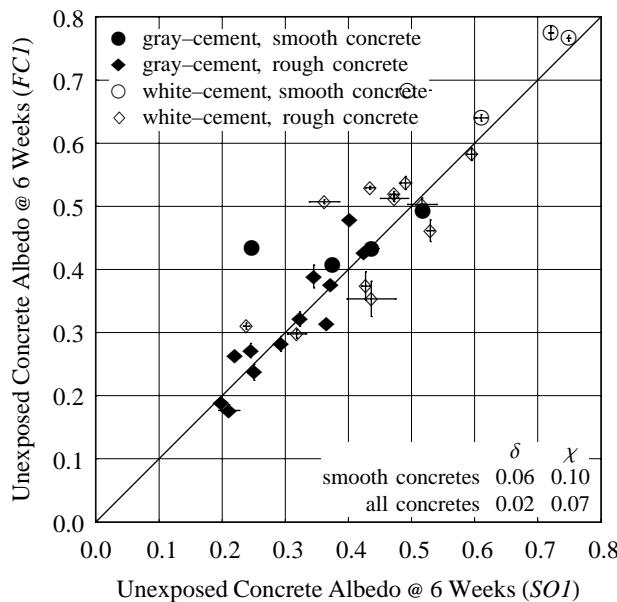
## *Appendices*

### **A Effects of Wetting and Drying on Rate Of Concrete Albedo Growth**

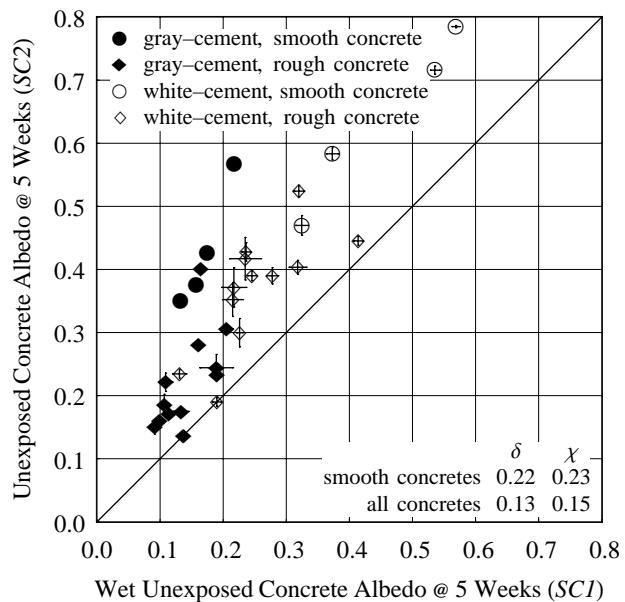
The rate of concrete albedo growth varied between sample sets. For example, there was a noticeable root-mean-square difference between the albedos of unexposed concrete sets *FC* and *SO* at week six (*FC1* vs. *SO1*:  $\chi_s=0.10$ ;  $\chi_a=0.07$ ) (**Figure A-1**). These reflectance differences may have resulted from variations in the degree to which concretes were dried with a hot-air gun prior to albedo measurement (see **Section 2.1**). That is, varying amounts of water may have been driven out of the concretes when their surfaces were dried. Such changes to water content would affect the cement hydration process.

Absorbed water temporarily depressed the albedos of curing concretes even after their surfaces were dried. For example, set *SC* (unexposed) was wetted and dried at five weeks to simulate rain. Its mean albedo at five weeks was appreciably higher dry than wet (*SC2* vs. *SC1*:  $\delta_s=0.22$ ,  $\chi_s=0.23$ ;  $\delta_a=0.13$ ,  $\chi_a=0.15$ ) (**Figure A-2**), but still lower than that of unexposed, never-wetted set *FC* at six weeks (*SC2* vs. *FC1*:  $\delta_s=-0.05$ ,  $\chi_s=0.08$ ;  $\delta_a=-0.08$ ,  $\chi_a=0.11$ ) (**Figure A-3**). This albedo-depression effect diminished over time. By week 25, the mean albedo difference between never-wetted set *FC* and once-wetted set *SC* was quite small (*FC2* vs. *SC3*:  $\delta_s=0.02$ ,  $\chi_s=0.04$ ;  $\delta_a=0.02$ ,  $\chi_a=0.04$ ).

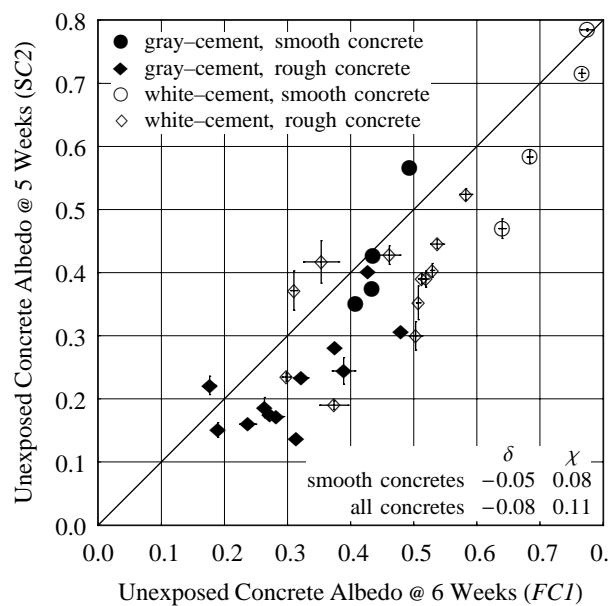
Wetting and drying the surfaces of older concretes had little long-term effect on their albedos. For example, the reflectances of the weathered surfaces were measured dry at 18 weeks (*WE3*), wet at 20 weeks (*WE4*), and dry again at 25 weeks (*WE5*). Their mean dry albedo at 25 weeks was only slightly higher than at 18 weeks (*WE5* vs. *WE3*:  $\delta_s=0.01$ ,  $\chi_s=0.02$ ;  $\delta_a=0.01$ ,  $\chi_a=0.03$ ) (**Figure A-4**).



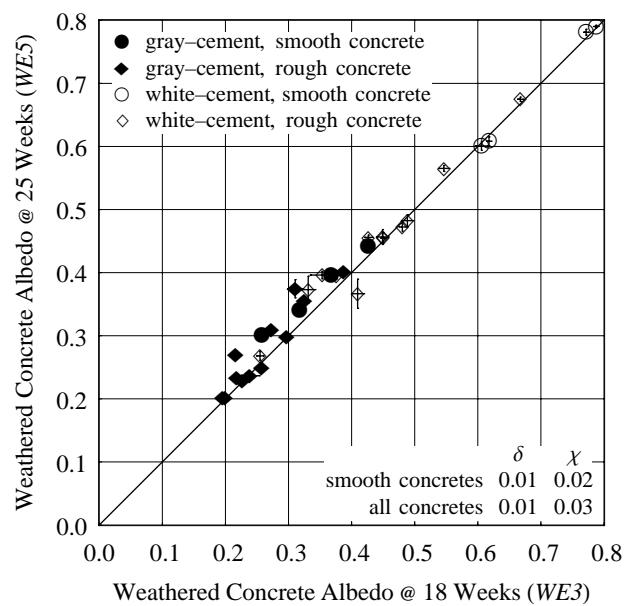
**Figure A-1. Set-to-set differences in albedos of unexposed concretes.** The albedos of some unexposed, unwetted concretes differed noticeably from set to set at week six, possibly due to wetness-related variations in rates of curing.



**Figure A-2. Immediate effect of drying on albedo of wet concrete.** Drying significantly increased the albedos of many wetted, unexposed concretes at week five.



**Figure A-3. Effect of wetting and drying on albedo growth in immature concretes.** The albedos at week five of many wetted-and-dried, unexposed concretes were appreciably lower than those at week six of their never-wetted, unexposed counterparts.



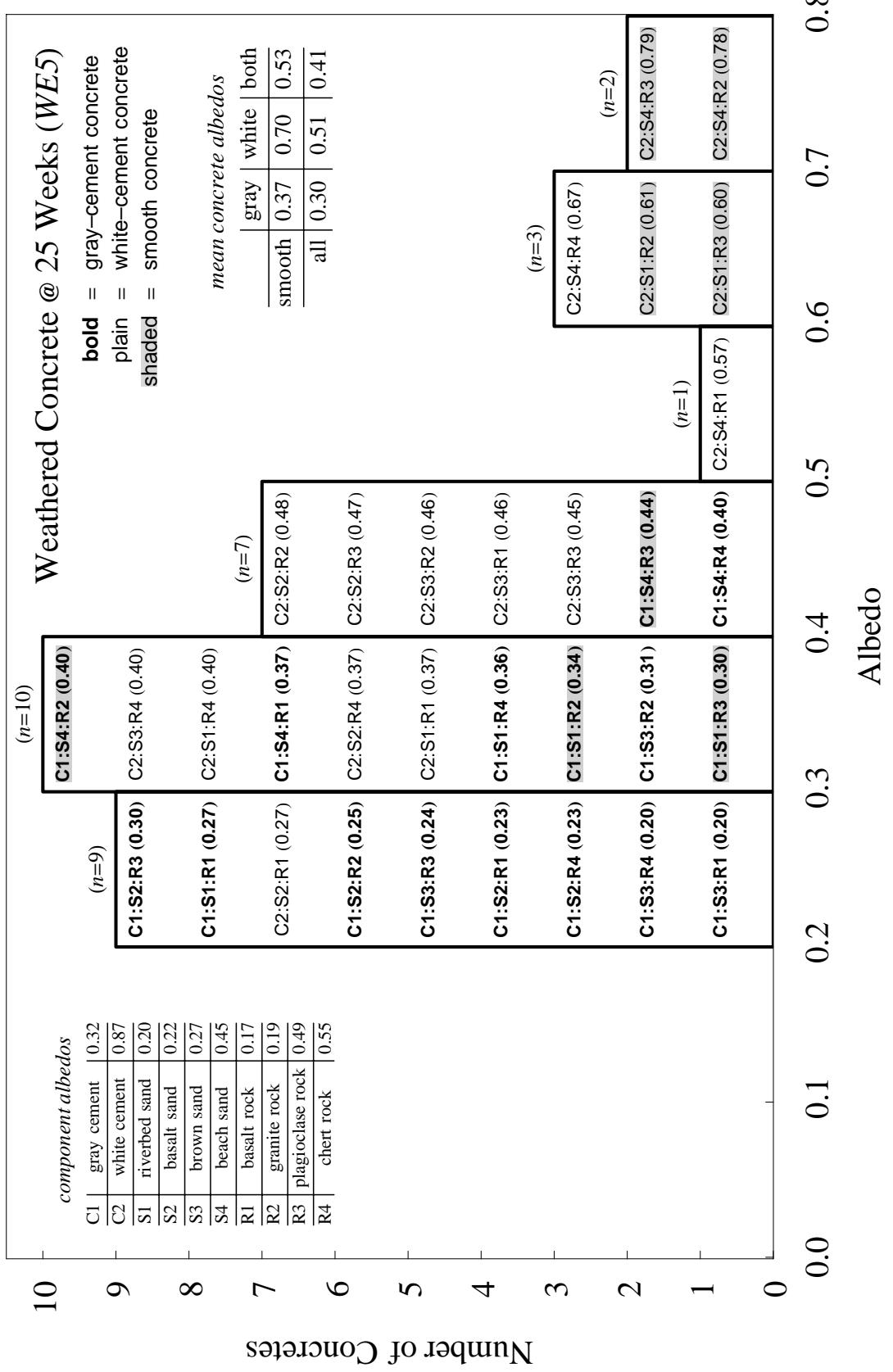
**Figure A-4. Effect of wetting and drying on albedo growth in mature concretes.** The albedos of mature weathered concretes changed little from weeks 18 to 25, despite wetting and drying at week 20.

## B Albedos of Mature Concretes

This appendix details the “mature” reflectances of the 32 mixes of concrete. These albedos were measured after at least 20 weeks of curing, and are presumed to have stabilized because the reflectance of unexposed concrete changed very slowly after six weeks of curing (see **Section 3.1**).

**Albedo Distributions.** The albedos of weathered, weathered and wetted, soiled, abraded, and formed surfaces of each variety of concrete are shown in **Figure B-1** through **Figure B-5**.

**Concrete Albedo Vs. Composition.** The variations of the albedos of formed, weathered, soiled, and abraded concretes with albedos of cement, sand, and rock are shown in **Figure B-6** through **Figure B-8**.



**Figure B-1.** Albedos of mature, weathered concretes.

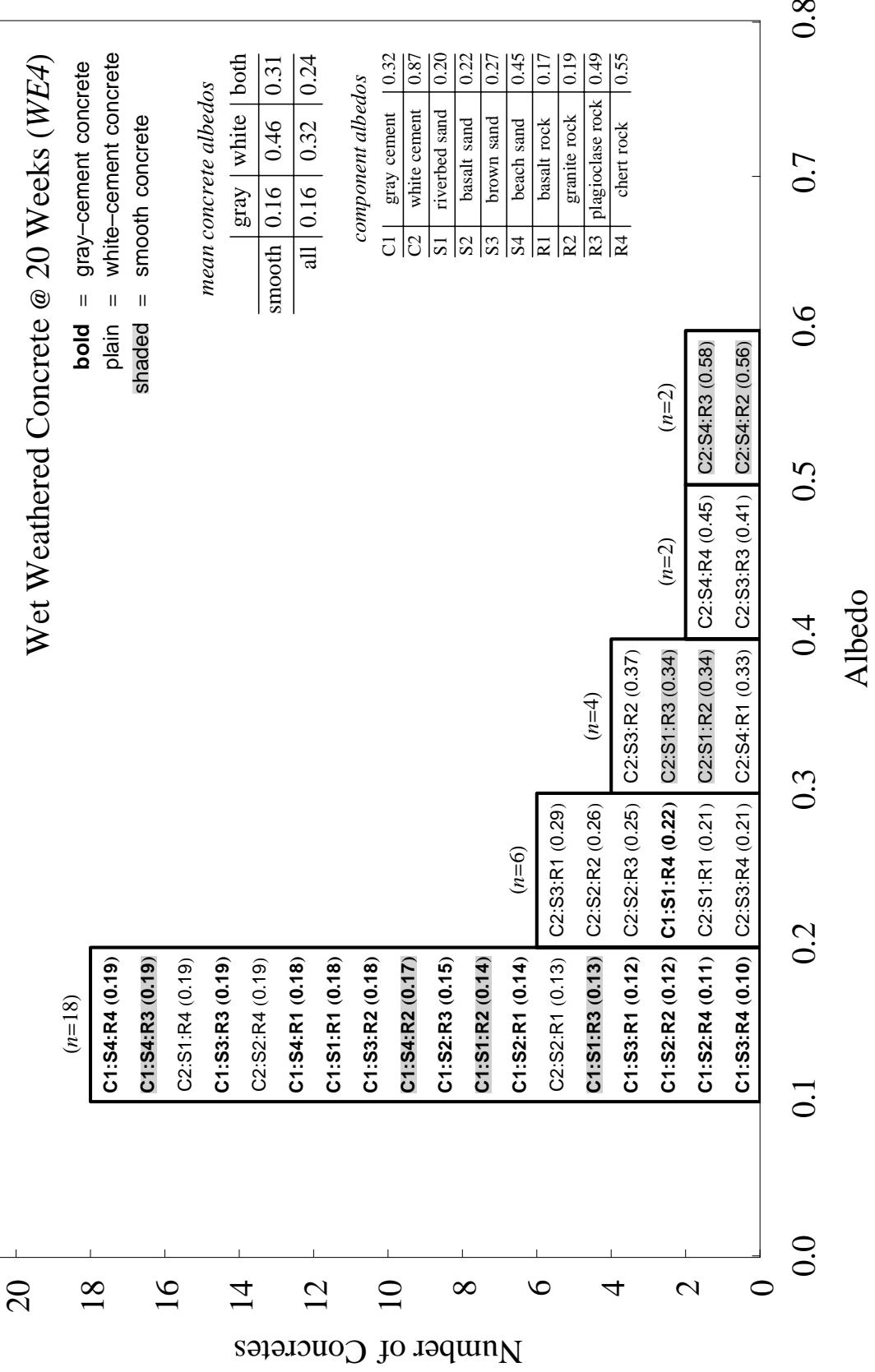


Figure B-2. Albedos of mature, wet, weathered concretes.

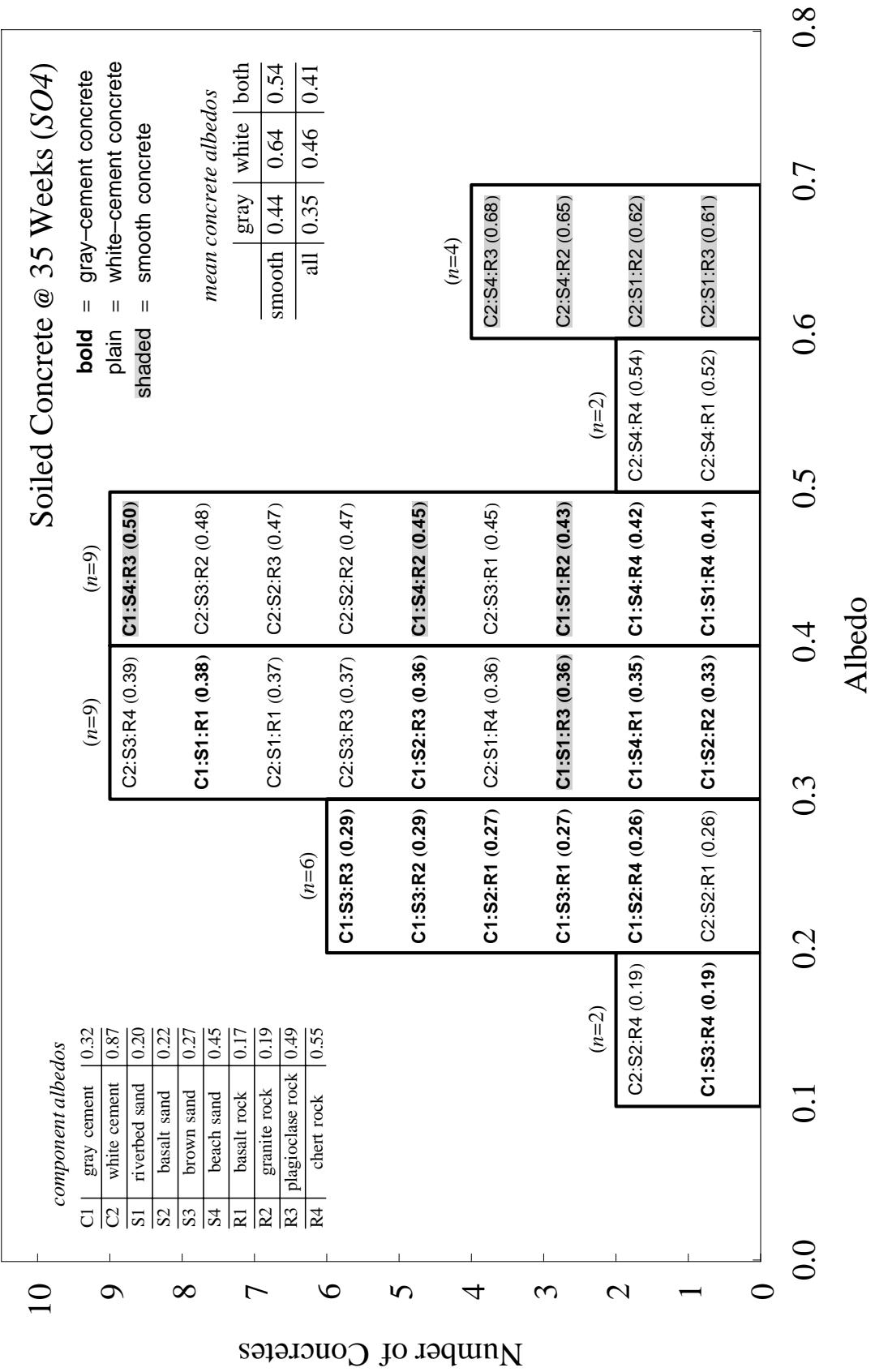


Figure B-3. Albedos of mature, soiled concretes.

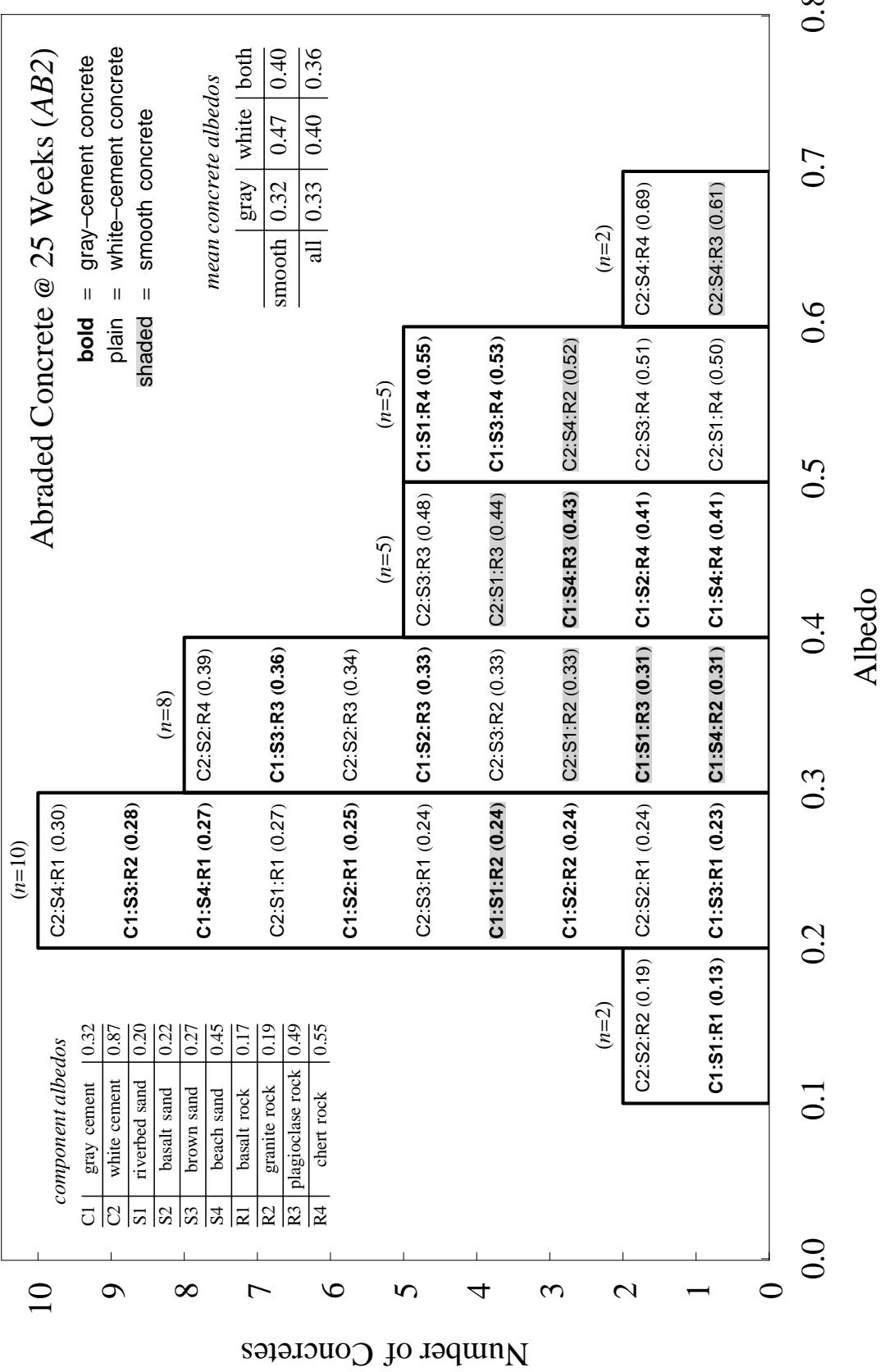


Figure B-4. Albedos of mature, abraded concretes.

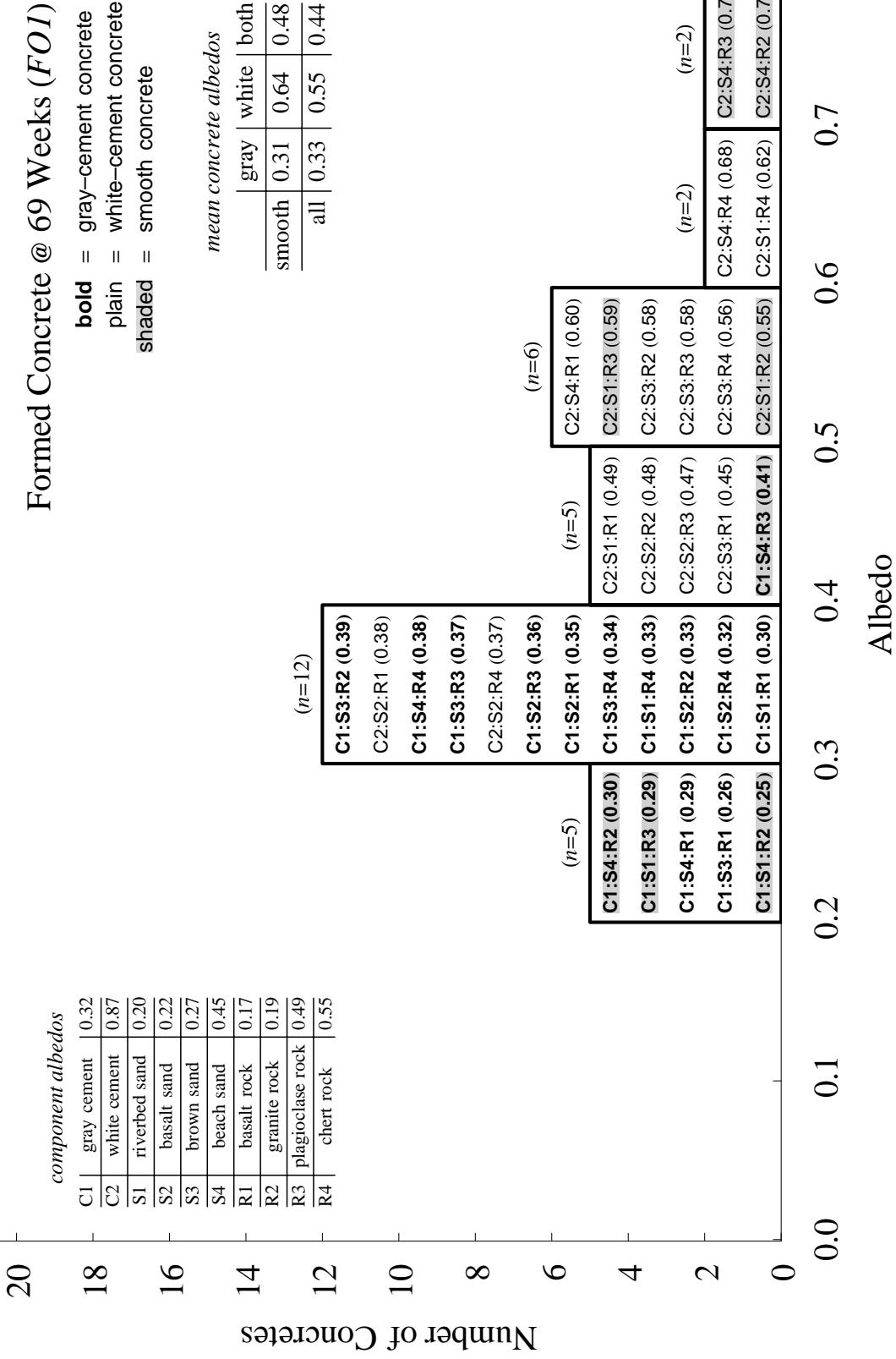
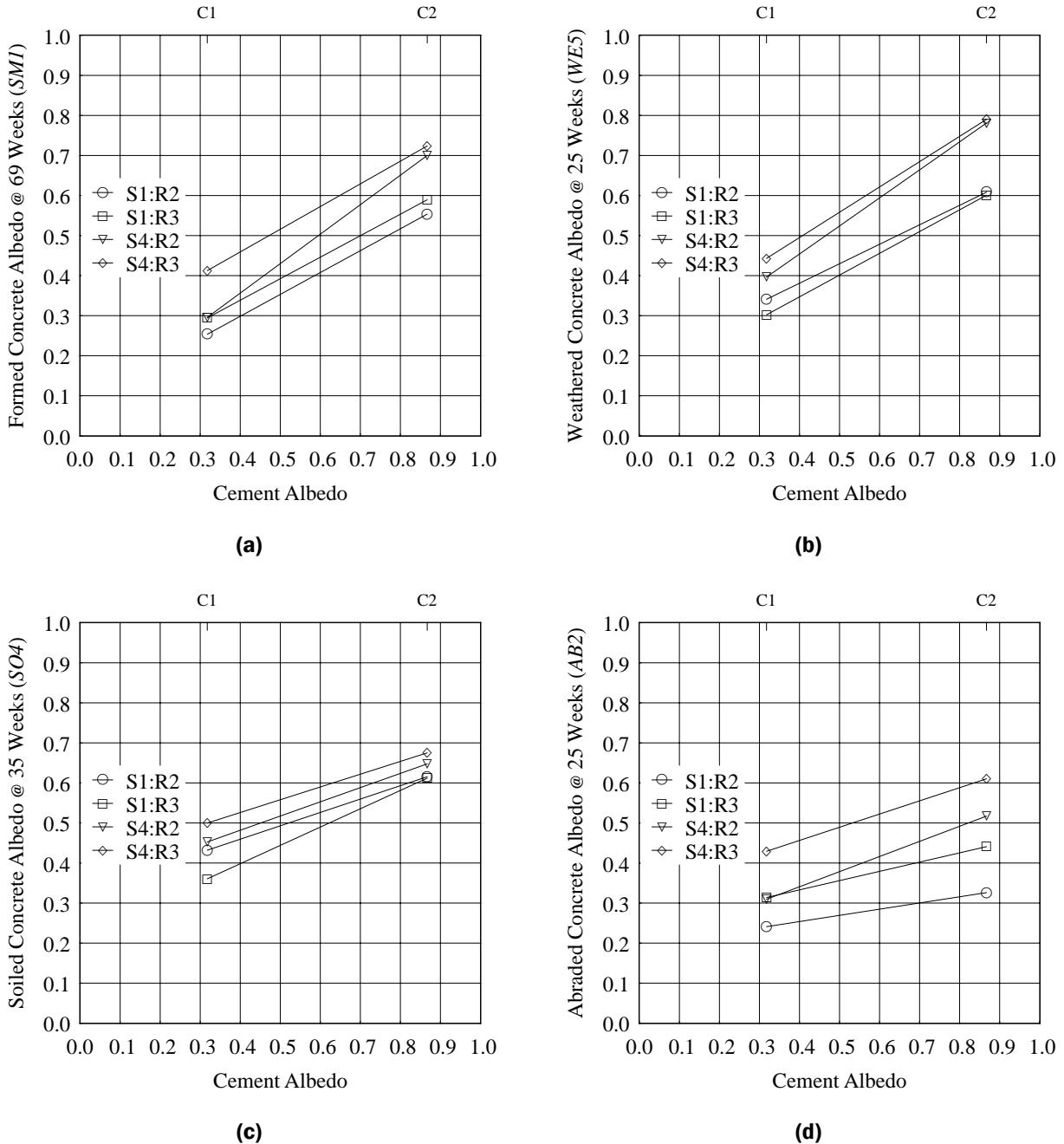
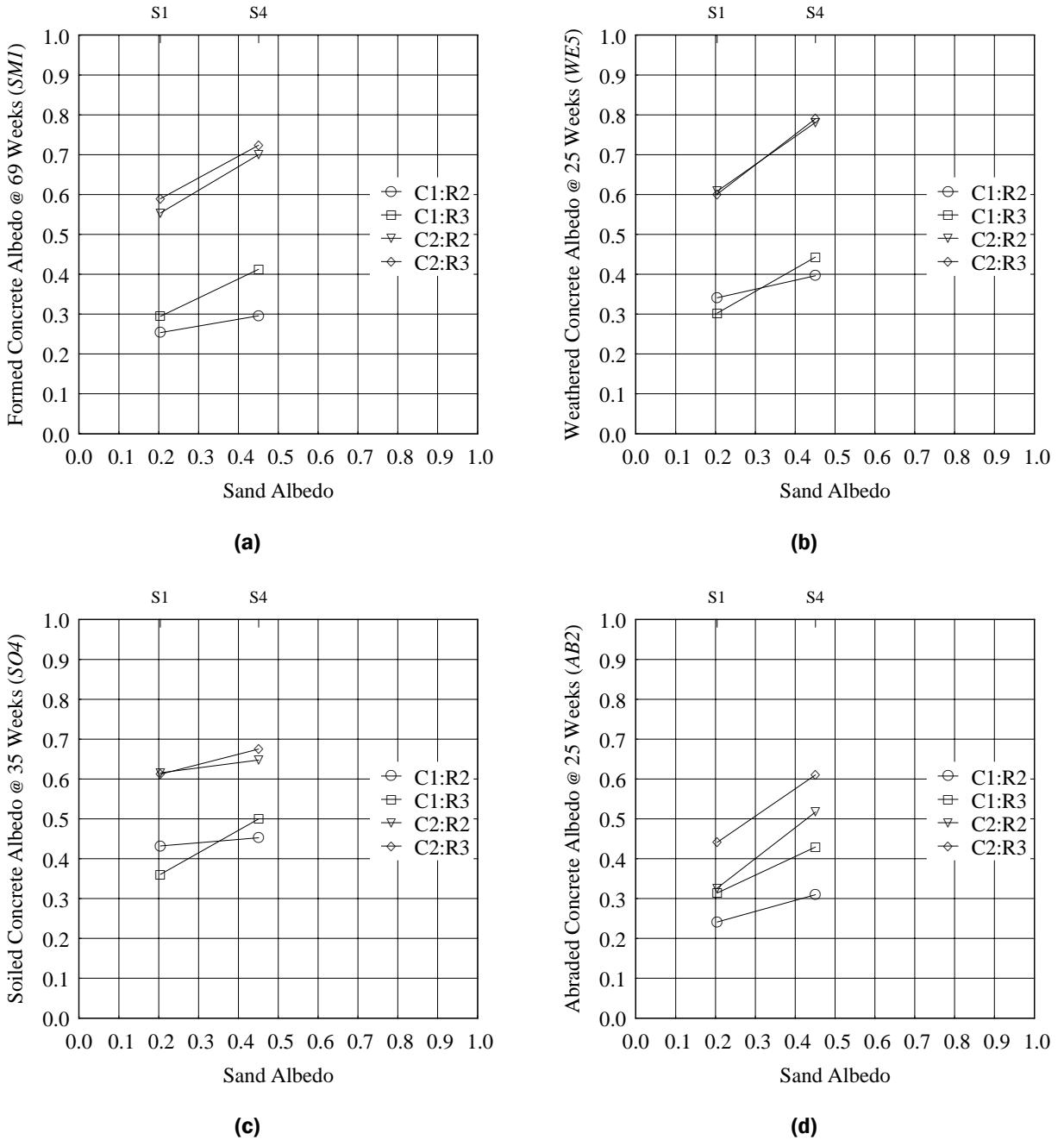


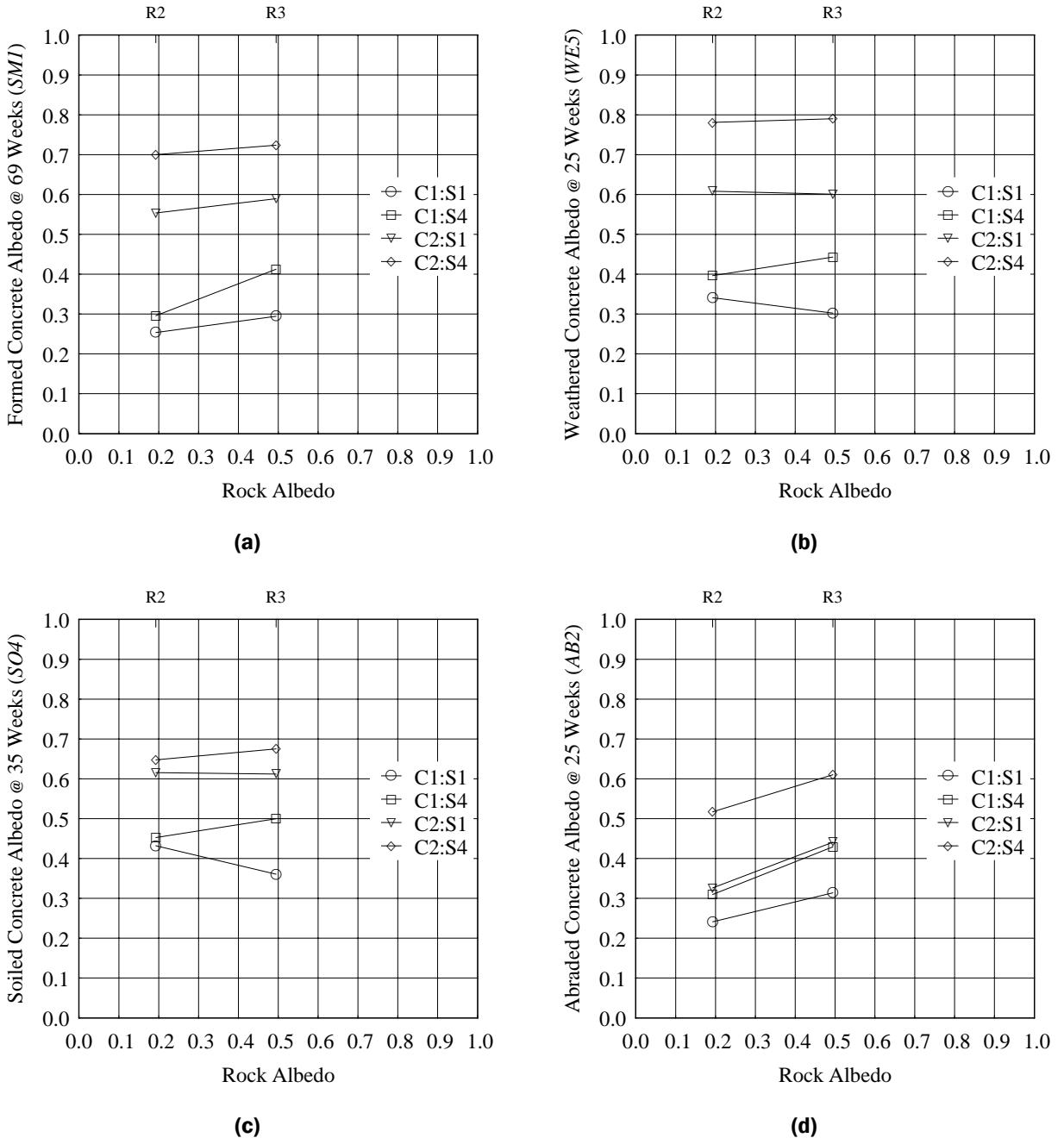
Figure B-5. Albedos of mature, formed concretes.



**Figure B-6. Mature, smooth concrete albedo vs. cement albedo.** Mature albedos of (a) formed, (b) weathered, (c) soiled, and (d) abraded smooth concretes correlated with cement albedo. Lines connecting data points should not be used for interpolation.



**Figure B-7. Mature, smooth concrete albedo vs. sand albedo.** Mature albedos of (a) formed, (b) weathered, (c) soiled, and (d) abraded smooth concretes correlated with sand albedo. Lines connecting data points should not be used for interpolation.



**Figure B-8. Mature, smooth concrete albedo vs. rock albedo.** Mature albedos of (a) formed, (b) weathered, and (c) soiled smooth concretes did not strongly correlate with rock albedo, but that of (d) abraded smooth concrete did well correlate with rock albedo. Lines connecting data points should not be used for interpolation.